Title: Let's Get Slopey

Brief Overview:

This lesson will introduce the concept of slope of a line in a Cartesian plane. Using a CBL unit and graphing calculator, the lesson will help explain the relationship between the X and Y axes as they are related to time and distance (giving "X" and "Y" tangibility). It will allow for the deduction of slope being a relationship between the rise and run of a line. It will also show how to graph a line using a table of values.

Links to Standards:

- **Algebra**
  Students will apply knowledge of tables, graphs, mathematical operations, and estimation.

Grade Level:

Grades 8/9, Pre-Algebra/Algebra I

Duration/Length:

This activity will require approximately 2-3 days to complete.

Prerequisite Knowledge:

The students should be familiar with the Cartesian plane, the positive and negative areas of the plane, and an understanding of every point having an X and a Y coordinate.

Objectives:

Students will be able to:

- use the TI-82 calculator to create a linear graph from a table.
- explain slope as a function of time, distance, and speed.
- interpret a linear graph as to movement as it is related to time, distance, and speed.

Materials:

- Graph paper
- TI-82 calculator with overhead adapter
- CBL unit and a motion detector compatible with the CBL
- Overhead projector
- "Hiker" program for the TI-82

Development/Procedures:

Set-up: Place the motion detector in a stationary, optimal position in the classroom.

1. Using the overhead adapter and the TI-82, the teacher will lead a demonstration of how to graph a line by entering the "X" values into "List 1" and the "Y" values into "List 2."

2. The teacher will explain the correspondence between the "X" axis to time and the "Y" axis to distance.

3. The teacher will lead a discussion on what a line might look like if, from a stationary point and over time, one stands still, one moves slowly towards/away, and one moves quickly towards/away. A discussion on rise/run and negative/positive slope should be held at this time.

4. The teacher will create a graph using "stat plot" and "zoom stat" on a Cartesian plane (on the overhead) and explain that when "X" (or time) is 0, the distance from the stationary point (the motion detector) will be the "Y" value (in feet). The teacher will then explain that as time moves to 1, 2, 3, etc. seconds, the distance from the motion detector will be Y1, Y2, Y3, etc. The teacher will, at this point, enter his/her coordinates into List 1 and List 2 of the TI-82 and project the image.

5. The teacher will demonstrate how to create a graph by using the motion detector and the CBL unit.

6. The teacher will then have each student create their own graph by moving slowly, then quickly, and also by remaining still.

Evaluation:

The students will be evaluated continuously during the discussion portion of the activity through question and answer as well as the homework activity sheet. Also, the students should have an opportunity to give feedback after each of their attempts.

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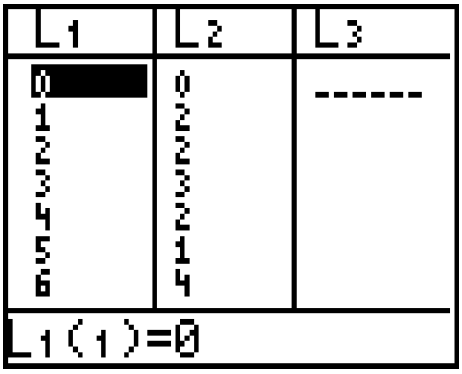
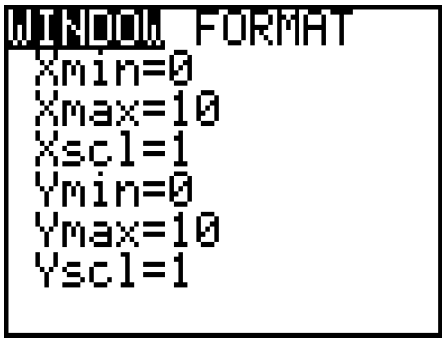
Name_____
Date_____

STUDENT CALCULATOR ACTIVITY WORKSHEET

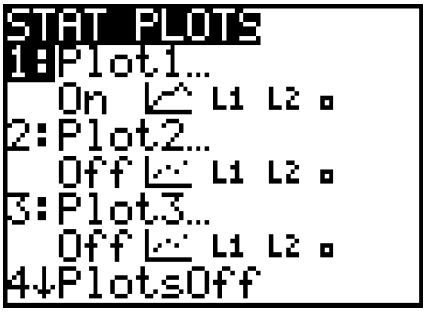
1) Using the "STAT" function, enter:
   L1: 0,1,2,3,4,5,6,7,8,9,10 (these will be your X-coordinates)
   L2: 0,2,2,3,2,1,4,6,9,7,7 (these will be your Y-coordinates)



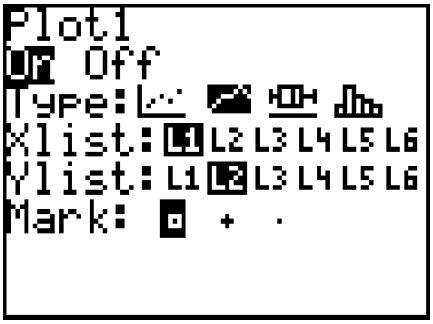
2) Using the "WINDOW" function, set the X min, max, scl and the Y min, max, scl to the following:



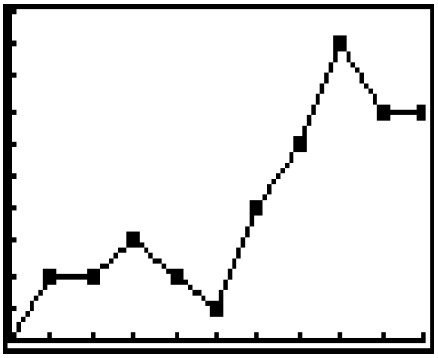
3) Using the “STAT PLOT” function (2nd then Y=), enter, set “Plot 1" to the following:



NOTE: Make sure the other Plots (2 & 3) are “OFF”



4) Push the “GRAPH” button to view the graph.



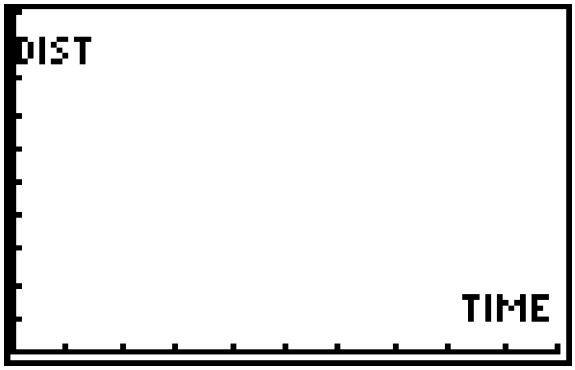
5) Create your own graph by repeating steps 1-4 changing L2. (IMPORTANT: in step 2 the Ymax must be at least as big as the largest number in L2.)

Name_____
Date_____

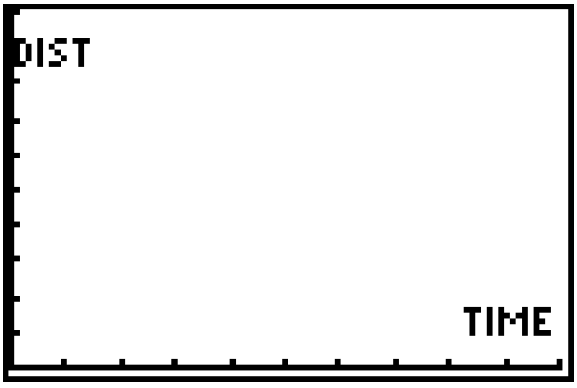
CBL SLOPE ACTIVITY WORKSHEET

Instructions for using the CBL and motion detector.

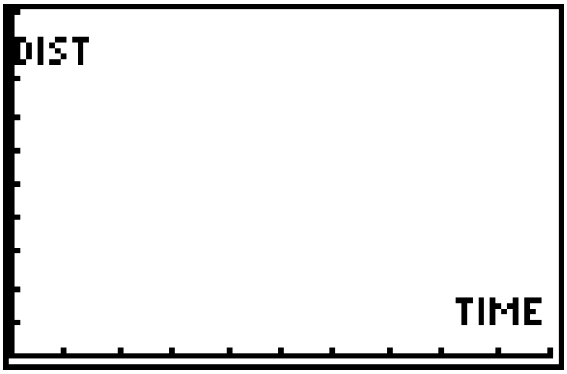
1) Remain still while the program runs. Draw the graph.



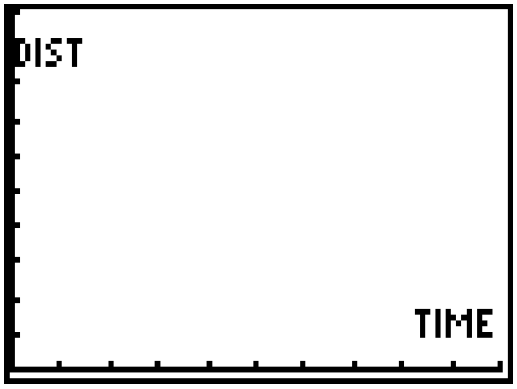
2) Starting about 1 foot from the detector, move away quickly. Draw the graph.



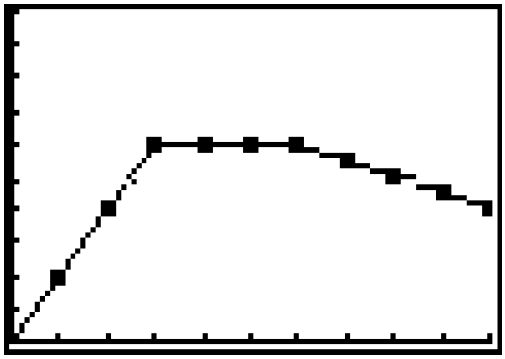
3) Starting about the same distance as in #2, move away slowly. Draw the graph.



4) Starting at the same spot, move away and then back towards the detector. Draw the graph.



5) Describe the movement of a person that created the following graph. (Did they move away/towards, quickly/slowly, stand still, etc.?



Description: